

REMARKS

Reconsideration of the application in light of the following remarks is respectfully requested.

Status of the Claims

Claims 1 - 24 are currently pending in the present application. Applicants cancel claims 23 and 24 without prejudice or disclaimer, and amend claims 1 and 17 to incorporate the limitations of claims 23 and 24, respectively. No new matter is introduced.

Rejection under 35 U.S.C. § 112

Claims 19 - 24 are rejected under the second paragraph of 35 U.S.C. §112 as lacking sufficient antecedent basis for the term “said other element.” Applicants believe that the Examiner intends to apply this rejection only to claims 20 – 22, as claims 19, 23 and 24 do not include the objected claim term. Applicants amend base claim 1, from which claims 20 – 22 depend, to provide sufficient antecedent basis to support the objected-to term.

Accordingly, Applicants respectfully request that the rejections of claims 19 – 24 under the second paragraph of 35 U.S.C. §112 be withdrawn.

Rejection under 35 U.S.C. § 103

Claims 1, 9 and 16 - 19 are rejected under 35 U.S.C. §103(a) as being unpatentable over Japanese Patent Publication No. 4-245135 to Masahiro (“Masahiro”) in view of Japanese Patent Publication No. 10-294077 to Osamu et al. (“Osamu”). Claims 2, 8 and 10 - 14 are rejected under 35 U.S.C. §103(a) as being unpatentable over Masahiro and Osamu in view of U.S. Patent No. 5,541,423 to Hirabayashi (“Hirabayashi”). Claims 3, 6 and 15 are rejected under 35 U.S.C. §103(a) as being unpatentable over Masahiro and Osamu in view of Japanese Patent Publication No. 2001-68011 to Hisahiro et al. (“Hisahiro”). Claim 4 is rejected under 35 U.S.C. §103(a) as being unpatentable over Masahiro and Osamu in view of Japanese Patent Publication No. 2000-243217 to Hiroyuki et al. (“Hiroyuki”). Claim 5 is rejected under 35 U.S.C. §103(a) as being unpatentable over Masahiro, Osamu and Hiroyuki in view of U.S. Patent No. 6,445,114 to Kurokawa et al. (“Kurokawa”). Claim 7 is rejected under 35 U.S.C. §103(a) as being unpatentable over Masahiro and Osamu in view of Japanese Patent Publication No. 2001-118488 to Hisashi (“Hisashi”). Applicants amend independent claims 1 and 17 to further clarify the nature of their invention, and respectfully traverse the rejections of claims 1 - 19 under 35 U.S.C. §103(a).

In amended independent claim 1, Applicants claim:

1. A diamond electron emission device comprising a light emitting device for irradiating light to a cathode, wherein at least an electron emission face of said cathode is made of diamond and the light emitting device emits light from a junction formed between the cathode and another element of the light emitting device.

(Emphasis added).

Masahiro discloses a vacuum tube device having an optically excited electric field emission P-type semiconductor cathode 107 formed in proximity to a luminous part 103, and an anode electrode 110 positioned over the cathode 107(see, e.g., abstract of Masahiro). When an electric field is applied to the cathode 107 and light is radiated from the luminous part 103, electrons of the cathode are excited from a low energy state to a high energy state, thereby lowering the electric field required for electron emission. As can be seen with reference to FIG. 8(d) of Masahiro, light is radiated by the luminous part 103 across an open space and upon an external tip end surface of the cathode 103.

Osamu discloses a field emission type light-electric current converter comprising a plurality of small, needle-shaped electron emitting sources 2 that face a current collecting electrode 3 over a gap (see, e.g., FIG. 1 of Osamu). A light source is externally provided to irradiate tip ends of the electron emitting sources 2, in order to affect the current produced at the tip ends and collected by the current collecting electrode 3. The Examiner suggests that Osamu at paragraph [0004] discloses that at least an emission face of each electron emitting source 2 is made of diamond.

Applicants claim a diamond electron emission device including a light emitting device for irradiating a cathode. At least a face of the cathode is made of diamond, In sharp contrast both to Masahiro and Osamu, the light emitting device claimed by Applicants emits light from a junction formed between the cathode and another element of the light emitting device. Applicants explain the benefits of this approach as follows at page 4, lines 17 - 21:

Still further, the light emitting device is preferably pn junction of diamond. Since the light emitting device made of the pn junction diamond emits short wavelength light such as free exciton emission at 5.27 eV, the electron emission is facilitated.

Also, using the same material as the cathode, it is easy to form the light emitting device and the cathode as one unit.

In sharp contrast to Applicants' invention as claimed, none of Masahiro, Osamu, or any other of the cited references, teach or suggest a diamond electron emission device having a light emitting device formed from a junction between a diamond cathode and another element of the light emitting device. For at least this reason, Applicants submit that amended independent claim 1 is not obvious, and stands in condition for allowance. As amended independent claim 17 substantially includes the above-argued elements of allowable independent claim 1, Applicants submit that independent claim 17 is also allowable. As each of claims 2 - 16, 18 and 19 depends either directly or indirectly from one of allowable claims 1 and 17, Applicants further submit that dependent claims 2 - 16, 18 and 19 are also allowable for at least this reason.

Therefore, Applicants respectfully request that the rejection of claims 1 - 19 under U.S.C. §103(a) be withdrawn.

CONCLUSION

Each and every point raised in the final Office Action mailed December 5, 2008 has been addressed on the basis of the above amendments and remarks. In view of the foregoing it is believed that claims 1 - 22 are in condition for allowance, and it is respectfully requested that the application be reconsidered and that all pending claims be allowed and the case passed to issue.

If there are any other issues remaining which the Examiner believes could be resolved through a Supplemental Response or an Examiner's Amendment, the Examiner is respectfully requested to contact the undersigned at the telephone number indicated below.

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Respectfully submitted,

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